

## Bogota Bag as Temporary Abdominal Closure

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### KEYWORDS

Bagota bag, Single hem, Wittmann patch, abdominal closure.

### ABSTRACT

The Bogotá bag, a sterile plastic device for temporary abdominal closure, has become integral in managing open abdomen cases due to trauma, intra-abdominal infections, and abdominal compartment syndrome (ACS). This review outlines its indications, advantages, disadvantages, and technique. Known for its cost-effectiveness and simplicity, the Bogotá bag allows for reoperations and drainage, making it valuable in resource-limited settings. However, limitations include infection risk, evisceration, inadequate fascial traction, and entero atmospheric fistulas. Proper patient assessment, secure placement, and close monitoring are essential for minimizing complications. While effective, the device's drawbacks highlight the need for further research to refine its use in surgical care.

## 1. Introduction

The Bogotá bag is a temporary abdominal closure device that has been described for use in the treatment of a broad range of surgical pathologies, especially in the setting of abdominal compartment syndrome. For this reason, it represents a sound option also to reduce these risks, especially if considering the ability to tamponade abdominal pack closure and allow continuous monitoring with intermittent intervention. [1]

The spectrum of temporary abdominal closure techniques has evolved over decades, and as such, multiple solutions have been introduced, including the Bogotá bag, negative pressure wound therapy, and the commercial use of synthetic mesh for this purpose. Each of these methods has its pros and cons. The Bogotá bag, for example, is simple and cheap, but it potentially did not grip the fascia edges very well, resulting in lateral retraction of the fascia, thus closure rates might be low. [2,3]

The Bogotá bag was introduced by Oswaldo Borraez in 1984, and it has been used in multiple clinical applications over the years, including trauma and emergency surgery [4]. Its versatility and simple design, which minimizes closure materials/techniques, also make this device useful, especially in resource-limited settings where other sophisticated techniques of closure are not available [5]

The Bogotá bag has established as an important method for temporary abdominal closure, mainly in open abdomen cases. Our technique using a standard urine collection bag has been shown to be an effective and cost-effective solution for the management of reflex voiding, saving extremely precious time and preventing complications for later fast lifesaving open surgery. Reported primary closure rates for the Bogotá bag range from 12% to 82%, and the development of entero atmospheric fistulas ranges between 0% to 14.4% [6,7].

## 2. Indication for Bogota Bag Application

One of the most important indications for using the Bogotá bag is in acute trauma when rapid release of IAP is necessary to avoid progression to ACS. The risk of developing intra-abdominal hypertension is therefore significantly increased in trauma patients, such as those requiring massive fluid resuscitation [8,9].

The Bogotá bag can be used to effectively control the open abdomen; second-look and reoperation may be performed over a long period without major IAP-related complications (Richter et al., 2009). This is especially useful in damage control surgery, where the patient needs initial stabilization and control of bleeding before definitive closure [10].

The Bogotá bag is also used for open abdominal incisions, particularly in cases of major intra-abdominal infections or severe sepsis, where it may be necessary to have the abdomen drained and monitored (Edwards & Siddiqui, 2003). In such cases, the bag serves as a sheath that separates external contaminants from accessible portions of the abdominal wall for ongoing treatment. In situations of extreme intra-abdominal hypertension (IAH), the use of the Bogotá bag may prevent further pressure escalation and subsequent organ dysfunction, leading to improved patient outcomes [11].

The Bogotá bag is also recommended in cases with abdominal wall defects or those undergoing procedures with potential loss of abdominal domain. When used in such cases, it allows abdominal contents to be kept inside while minimizing the risks of evisceration or subsequent complications [12].

In patients with conditions that increase the risk of developing abdominal compartment syndrome, such as pancreatitis, significant bowel distension or the presence of hemoperitoneum, it is recommended to use a Bogotá bag. The bag can help manage intra-abdominal pressure and prevent ACS, which is crucial for preserving organ function and stabilizing the patient [13].

The Bogotá bag is indicated in several clinical scenarios, including:

1. **Trauma:** The Bogotá bag has been used to fully focus on the open abdomen treatment in traumatized cases of abdominal injuries, enabling rapid decompression and further management surgeries [14].
2. **Intra-abdominal Infections:** For patients who have developed severe intra-abdominal infections or sepsis, temporary abdominal closure might be necessary to allow for drainage and monitoring while preventing contamination [15].
3. **Abdominal Compartment Syndrome:** The Bogotá bag can specifically assist in preventing and regulating abdominal compartment syndrome, as increased abdominal pressure may potentially decrease organ function [16].
4. **Abdominal Wall Defects:** In patients with large midline abdominal wall defects, the Bogotá bag may provide temporary closure and support while surgical correction is being scheduled [17].

### **3. Techniques**

#### **Preparation**

A detailed evaluation of the patient should be performed prior to using the Bogotá bag. This includes patient evaluation (i.e., hemodynamic status, the extent of abdominal injury, and if there are signs of intra-abdominal hypertension or infection). Assessment of vital signs, urine output, and laboratory values, including lactate levels, will allow an indirect impression of the underlying pathophysiology, and the tempo of intervention can be guided [6]. The surgical team should set up the operating room, completing all necessary instruments and materials. These include a sterile 3L genitourinary irrigation bag, suture, sterile drapes, and antiseptic solutions. During the procedure, the surgical team must wear proper personal protective equipment (PPE) to maintain a sterile environment [9]. The patient should be admitted as an inpatient, and anesthesia should be administered at a general anesthesia level to ensure comfort and immobilization during the procedure. It is essential that during the surgical intervention, vital signs are continuously tracked [14].

#### **Application of the Bogotá Bag**

If the abdominal cavity is not already open, a midline incision is made, large enough to allow for proper visualization and handling of this region [15]. Once the abdomen is open, the team should inspect for any injuries to the abdominal contents, blood loss, or infection. Surgical interventions to manage hemorrhage or drain abscesses should all be completed at this stage [16].

#### **Placement of the Bogotá Bag**

Once surgical issues are addressed, the Bogotá bag is prepared for placement. The sterile bag must undergo quality checks. The bag is placed over the abdominal cavity to cover any exposed viscera. The edges of the bag are sutured to the skin or fascia of the anterior abdominal wall using absorbable sutures, ensuring a stable hemostatic seal to avoid evisceration and infection [17].

The sutures need to be placed continuously, and the bag should be secured tightly to the abdominal wall. Care must be taken to avoid excessive tension, which could put pressure on blood vessels and affect surrounding tissues [5].

Once the bag is secured, it can be adjusted to accommodate the volume of intra-abdominal contents. The bag should be inflated with sterile saline or air to create a barrier against external contaminants while allowing for some degree of expansion as intra-abdominal pressure changes [18].

#### **Post-Application Care**

Following the closure of the Bogotá bag, continuous monitoring of both vital signs and intra-abdominal pressure is crucial. Bladder pressure measurement can be used to assess intra-abdominal pressure indirectly. Fluid management must be judicious to avoid overloading the abdominal cavity and increasing intra-abdominal pressure. The surgical team should monitor urine output and adjust fluid administration accordingly [19]. The Bogotá bag is a temporary closure, and the timing for reoperation must be planned. The decision for reoperation is based on the patient's condition, the resolution of intra-abdominal hypertension, and the cause of the open abdomen [20]. Comprehensive documentation, including the indications for the Bogotá bag, the condition of the abdominal contents, and any intraoperative findings, is critical for continuity of care and future surgical planning [21].

#### **4. Contraindications for the Use of the Bogotá Bag**

The Bogotá bag is a widely utilized technique for temporary abdominal closure, particularly in trauma and emergency surgery. However, certain contraindications must be considered to ensure patient safety and optimal outcomes. Understanding these contraindications is crucial for surgical teams when deciding on the appropriate method for managing the open abdomen.

##### **Presence of Significant Contamination**

The main contraindication for the Bogotá bag is major peritoneal contamination. For patients with fecal contamination or extensive abdominal infections (eg, perforation peritonitis), the Bogotá bag may not provide sufficient barrier against bacterial contamination. Instead, given that VAC systems deliver more effective drainage and assist with local infection control [16].

##### **Severe Abdominal Wall Defects**

For patients with wide abdominal wall defects and previous surgeries that weaken the structure of the abdomen, the use of a Bogotá bag may not be appropriate. It is due to the fact that its effective securitization to the abdominal wall forms the bases of this technique, and a wide defect may compromise closing of this [5, 6].

##### **Intra-abdominal Hypertension**

The use of the Bogotá bag for control of intra-abdominal hypertension is effective in cases associated with medical care, but it should be avoided when no definitive treatment is available. An open abdomen irrigation and aspiration system such as the Bogotá bag may also be injurious if ongoing bleeding or distension of bowel that cannot be controlled, leading to worsening abdominal situations, which in turn can lead to further complications, such as severe abdominal compartment syndrome [22].

##### **Patient's Overall Clinical Condition**

The overall clinical condition of the patient is a critical factor in determining the appropriateness of the Bogotá bag. Patients who are hemodynamically unstable or have significant comorbidities may not tolerate the potential complications associated with the use of a Bogotá bag. For instance, patients with severe respiratory distress or those requiring intensive monitoring may benefit more from alternative closure techniques that allow for better access and management of their condition [23,24]

##### **Risk of Enteroatmospheric Fistula**

A patient's overall health is very important factor when considering the Bogotá bag as a treatment option. The study by sabbagah et al. focused on examining how effective the Bogotá bag is and what complications might arise, especially in patients who are hemodynamically unstable or have serious underlying conditions [6].

##### **Inadequate Surgical Technique**

The effective use of the Bogotá bag depends largely on the surgical technique. Poor suturing or incorrect placement can result in complications like leakage, evisceration, or infection. As a result, if the surgical team is inexperienced or uncertain about using the Bogotá bag, it may be wiser to choose a more familiar closure method [25].

##### **Patient Preference and Informed Consent**

Lastly, the patient's choice should be taken into account when the Bogotá bag is planned. Patients should be informed about the possible risks and benefits of the technique and able to give their informed agreement. To support the patient's right to choose, if they say they don't want to use the Bogotá bag, other options should be

looked into to make sure they are comfortable [20].

## **5. Advantages of the Bogotá Bag for Temporary Abdominal Closure**

The Bogotá bag, a sterile plastic bag used for temporary abdominal closure, offers several benefits that make it a valuable tool in surgical practice, particularly when managing an open abdomen.

### **Cost-Effectiveness**

One of its key advantages is cost-effectiveness. Typically, a standard 3-liter genitourinary irrigation bag, the Bogotá bag is readily available and significantly less expensive than advanced closure methods like vacuum-assisted closure (VAC) systems or mesh closures. This affordability makes it an appealing choice, especially in resource-limited settings where access to more advanced surgical materials may be limited [6].

### **Simplicity and Ease of Use**

The Bogotá bag stands out for its ease of use, allowing surgical teams of all experience levels to apply it without needing specialized training or equipment (Zahid, 2024). This accessibility makes it an invaluable tool, especially in emergencies, where time is of the essence. In trauma cases or acute abdominal conditions, being able to quickly deploy the Bogotá bag can be life-saving, as it immediately contains abdominal contents and provides crucial time for further surgical intervention [2].

### **Effective Management of Intra-Abdominal Pressure**

The Bogotá bag is designed to regulate the intra-abdominal pressure, which is very essential in averting complications such as abdominal compartment syndrome (ACS). The brief closure of the bag facilitates the monitoring and modulation of intra-abdominal pressure, therefore diminishing the risk of organ dysfunction linked to increased pressures [3]. This skill is especially advantageous in trauma and critical care environments, where patients may undergo swift alterations in their abdominal condition due to fluid resuscitation or persistent hemorrhaging.

### **Facilitates Reoperation and Drainage**

A key advantage of the Bogotá bag is its capacity to enable reoperation and drainage of intra-abdominal fluids. The bag facilitates straightforward access to the abdominal cavity, permitting surgeons to execute required interventions without supplementary incisions [16]. This function is especially beneficial in instances of severe intra-abdominal infections or abscesses, where continuous drainage is necessary for proper management of the patient's condition. The Bogotá bag may remain in situ until the underlying difficulties are addressed, after which permanent closure can be executed [17].

### **Versatility in Clinical Applications**

The Bogotá bag is versatile and can be used in various clinical scenarios, including trauma, intra-abdominal infections, and abdominal wall defects. Its adaptability makes it suitable for a wide range of patients, from those with acute injuries to those undergoing complex abdominal surgeries (Ismavel et al., 2021). The ability to tailor the use of the Bogotá bag to different clinical situations enhances its utility in surgical practice, allowing for individualized patient care.

### **Reduced Risk of Evisceration**

By securely containing the abdominal contents, the Bogotá bag significantly reduces the risk of evisceration, which can occur when the abdominal wall is compromised. This protective feature is essential in preventing complications associated with open abdomens, such as infection and bowel injury [5].

### **Minimal Fluid Loss**

The Bogotá bag helps minimize fluid loss from the abdominal cavity, which is particularly important in patients undergoing extensive fluid resuscitation. By providing a sealed environment, the bag reduces the risk of dehydration and electrolyte imbalances that can occur with open abdomens [19].

### **Enhanced Patient Comfort**

The use of the Bogotá bag can enhance patient comfort by providing a more stable abdominal environment compared to traditional packing methods. The bag allows for some degree of expansion and contraction, accommodating changes in intra-abdominal pressure without causing excessive discomfort to the patient [19].

## **6. Disadvantages of the Bogotá Bag for Temporary Abdominal Closure**

While the Bogotá bag is a valuable tool for temporary abdominal closure, it is not without its disadvantages. Understanding these limitations is crucial for surgical teams when considering the use of this technique in clinical practice. This section outlines the key disadvantages associated with the Bogotá bag, highlighting potential complications and challenges that may arise during its application.

### **1. Risk of Infection**

The main area of concern is the risk of infection from Bogotá-bag use. Even though the bag is supposed to create a sterile chamber, the open nature of the abdominal cavity can still allow for bacterial exposure. If the bag is not applied properly or if there are large amounts of contamination in the abdominal cavity, the likelihood of postoperative infections increases (Rencuzogullari et al., 2015). Complications from infections can escalate to severe forms like sepsis, prolonged hospitalization, and increased morbidity [21].

### **2. Complications Related to Evisceration**

Although Bogotá bags are designed to reduce the risk of evisceration, improper application or inadequate sealing can lead to complications. Abdominal contents may protrude through the abdominal wall if the bag is not properly attached, increasing the risk of evisceration (Reyes et al., 2013). This can result in severe complications like bowel injury and contamination of the abdominal cavity, necessitating repeat surgeries [11].

### **3. Inadequate Fascial Traction**

The Bogotá bag may not provide enough fascial traction, which is vital for healing and closing the abdominal wall. In cases where there is significant tension on the abdominal wall, insufficient traction may cause lateral retraction of the fascia, resulting in poor closure rates and a higher risk of incisional hernias [1]. This is particularly concerning for patients with compromised abdominal walls or those requiring prolonged bag use [8].

### **4. Limited Drainage Capability**

Though the Bogotá bag allows for some drainage of intra-abdominal fluids, it may not be as effective as other techniques like vacuum-assisted closure (VAC) systems. The bag doesn't actively promote drainage, which can lead to fluid buildup within the abdomen [9]. This accumulation can raise intra-abdominal pressure, increasing the risk of developing abdominal compartment syndrome (ACS) if not managed properly [26].

### **5. Potential for Enter atmospheric Fistula**

Using the Bogotá bag comes with the risk of developing enter atmospheric fistulas, especially in patients with pre-existing bowel pathology or those who undergo extensive bowel resections (Catena et al., 2015). These fistulas complicate recovery and may require additional surgeries to manage [27].

### **6. Patient Discomfort**

The Bogotá bag may cause patient discomfort, especially if it is not secured properly or if there is excessive tension on the sutures. Patients may experience pain or discomfort at the site of the bag, affecting their recovery and willingness to mobilize [12]. Additionally, the bag may restrict the patient's ability to move, potentially impacting their quality of life [28].

### **7. Requirement for Close Monitoring**

The use of the Bogotá bag requires close monitoring of the patient's condition, including intra-abdominal pressure, fluid balance, and signs of infection. This increases the workload for healthcare providers, especially in busy surgical or intensive care settings [16].

### **8. Limited Long-Term Data**

While the Bogotá bag has been successfully used in various clinical scenarios, there is limited long-term data on its effectiveness and safety compared to other closure techniques. The variability in outcomes with the Bogotá bag, such as primary closure rates and complications, highlights the need for further research to establish best practices [16].



## 7. Conclusion:

Bogotá bag represents a valuable tool in the management of the open abdomen, particularly in trauma and emergency surgery. Its design, ease of application, and cost-effectiveness make it a preferred choice in various clinical settings. As surgical techniques continue to evolve, ongoing research and clinical experience will further refine the application of the Bogotá bag and enhance its role in abdominal surgery.

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